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comprises at least one of an audio signal of music, vocals, singing and other such sounds.

52. (New) The method as recited in claim 35, wherein the input audio signal comprises at least one of an audio signal of music, vocals, singing and other such sounds.

53. (New) The apparatus as recited in claim 40, wherein said input audio signal comprises at least one of an audio signal of music, vocals, singing and other such sounds.

REMARKS

Applicants again request that all future correspondence be sent to the undersigned at the address set out below. While a similar request was made in applicants' previous response, the February 25, 1999 Office Action was improperly sent to Harold C. Knecht, III. The Examiner is respectfully requested to have his docket clerk make the appropriate change so all future correspondence is sent to the undersigned.

In the Office Action dated February 25, 1999, claims 14, 31, 33, 34, 35, 37, 40, 43 and 44 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,845,758 to Op de Beek et al., Audio Cyclopedia or Speech Production Models by Sadaoki Furui (hereinafter "Furui"); and claims 15 and 38 were rejected under § 103 as being unpatentable over the '758 patent, Audio Cyclopedia or Furui. The Office Action indicates that claims 2, 5, 9 and 24 recite allowable subject matter and would be allowable if rewritten in independent form.

Claim 28 was not rejected in the February 25, 1999 Office Action. The Examiner is respectfully requested to indicate in the next Office Action that claim 28 is allowable over the prior art.

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28, voice
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With this paper, claims 31, 35 and 40 have been amended to recite features which are considered to be inherent in the apparatus disclosed in the present application. Accordingly, no new matter is involved.

With regard to Furui, the Office Action states:

As to Furui text and Figs. 3.1 and 3.2, ordinary format synthesis feeds noise into bandpass filters to synthesize consonants (unvoiced sounds). *** The results of the frequency response as shown in Fig. 3.1 is as described in claims 31, 33-34, 43, 35-37, 14, 44 and 40.

Nowhere does Furui disclose, teach or suggest a circuit for enhancing the harmonic quality and sound source separation of an input audio signal. In contrast, the Furui circuit completely changes the input audio signal (white noise or a pulse) into an audible speech output signal which is unrecognizable from the original input signal. Claims 31, 35 and 40 have been amended to more clearly recite this distinction. Accordingly, it is submitted that claims 2, 5, 9, 14, 15, 24, 28, 31, 33-35, 38, 40, 43 and 44 define patentable invention over Furui.

With this paper new claims 51-53 have been added. With regard to these new claims, Furui does not disclose, teach or suggest inputting anything other than white noise or a pulse audio signal into the circuit illustrated in Fig. 3.2 (see page 29, line 4). Accordingly, it is submitted that new claims 51-53 define patentably over Furui.

With regard to the '758 patent, it states in column 11, lines 49-54:

Starting from the spectra of the signals presented to the inputs 83 and 85, a transfer function is derived in the analyzing unit 84 whereafter a control signal 86 is derived by using the transfer function obtained, which control signal is applied to the equalizer 1 for setting the filters.

The '758 patent further teaches in column 12, lines 21-25:

The frequency analyzing unit 84 has to supply such a control signal 86 to the equalizer 1 that a frequency characteristic is set in the equalizer 1 which is as much as possible the inverse of the characteristic $H_{xy}(f)$. (See Fig. 12a)

Thus, a transfer function is constantly being determined by unit 84 for space 81 and loudspeaker 80 based on a comparison of the input signal from 87 and the output signal recorded

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by the microphone 82. The unit 84 determines this transfer function by taking a ratio of the output signal from the microphone 82 to the input signal from 87. The unit 84 then inverts the determined transfer function and adjusts the equalizer 1 according to the inverted transfer function. That is, the filters of the equalizer 1 are adjusted so as to attenuate and amplify the various frequency components of the input signal from 87 according to the inverted transfer function. This inversion is performed in order to negate any affect the space 81 and loudspeaker 80 may have on the input signal. The result is a circuit that provides a listener with audible sound that is, as closely as possible, an undistorted conversion of the input signal (See Col. 1, lines 33-41 and Col. 11, line 37 to Col. 12, line 56).

Independent claim 31 recites the following limitation:

whereby an enhanced audio signal is produced *** such that audible sound reproduced from the enhanced audio signal exhibits a perceptively improved harmonic quality and sound source separation compared to audible sound reproduced from the input audio signal

Independent claims 35 and 40 recite similar limitations.

There is no teaching or suggestion in the Op de Beek et al. patent that the adjusted equalizer 1 will distort an input audio signal so as to produce an enhanced audio signal that, when converted into audible sound, exhibits a perceptively improved harmonic quality and sound source separation compared to audible sound reproduced from the input audio signal. On the contrary, Op de Beek et al expressly teaches to produce audible sound that exhibits a flat response when perceived or detected (i.e., sound that is perceived as undistorted). See Col. 1, lines 33-41 and Col. 11, line 37 to Col. 12, line 56, and particularly, Col. 12, lines 17-19. Accordingly, it is submitted that independent claims 31, 35 and 40, and all of the claims dependent therefrom, define patentable invention over the '758 patent.

With this paper new claims 46-50 have been added. With regard to these new claims, there is also no teaching or suggestion in the Op de Beek et al. patent that the adjusted equalizer

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1 will distort an input audio signal so as to produce an enhanced audio signal having frequencies (or frequency components) which increase in amplitude as per increasing frequencies from a reference frequency up to an amplitude peak at a high frequency, **wherein there is up to a total of only two significant amplitude peaks between the low end and the high end** (See new claims 46-50.).

An example transfer function $H_{xy}(f)$ for the loudspeaker 80 and the space 81 is illustrated in Fig. 12a of the '758 patent. As noted above, the unit 84 inverts this transfer function and adjusts the equalizer 1 according to the inverted transfer function. It is noted that "Fig. 12a only shows the amplitude transfer function in the low-frequency part of the total frequency range," see column 12, lines 19-21. In addition, in column 12, lines 28-30, it is stated that, generally, the transfer function in the low-frequency range of 20-700 Hz roughly comprises five significant peaks and dips. Therefore, if shown in its entirety, the Op de Beek et al. transfer function of Fig. 12a would include far more than the three amplitude peaks shown and, certainly, the inverted transfer function of the equalizer 1 would have far more than one or two significant amplitude peaks between the low end and the high end of the input audio signal. Accordingly, it is submitted that new claims 46-50 also define patentable invention over the '758 patent.

With regard to the Audio Cyclopedia, the Office Action states:

The standard Fletcher-Munson equalization curve is used to ensure equal subject loudness at all frequencies for listeners. When implemented in any real system, would have produced the response with frequency below 50 Hz goes to zero as does the response somewhere above the frequency of 15+kHz, as the results described in claims 31, 33-34, 43, 35-37, 14, 44 and 40.

On page 20, in section 1.76, starting at line 10, the Audio Cyclopedia discloses:

The curves of Fig. 1-76A made by Fletcher and Munson of the Bell Telephone Laboratories, are generally accepted throughout the sound industry as a basis for the design of devices concerned with human hearing.

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Nowhere does the Audio Cyclopedia disclose, teach or suggest how to use a Fletcher-Munson curve to design any device concerned with human hearing, let alone a circuit for enhancing an input audio signal. Nor does the Audio Cyclopedia disclose, teach or suggest a circuit for enhancing an input audio signal such that the transfer function of the circuit follows that of a Fletcher-Munson curve. The only disclosure of a circuit for distorting an input audio signal like that claimed comes from applicants' own specification, which cannot be used against them. Accordingly, it is submitted that claims 2, 5, 9, 14, 15, 24, 28, 31, 33-35, 37, 38, 40, 43 and 44 define patentable invention over the Audio Cyclopedia.

With this paper, new claims 45-53 have been added. It is submitted that no new matter is being added with these claims and that these claims define patentably over the prior art.

In view of the above remarks and amendments, applicants submit that claims 2, 5, 9, 14, 15, 24, 28, 31, 33-35, 37, 38, 40, 43-51 define patentably over the prior art. Early notification of allowable subject matter is respectfully requested.

Respectfully submitted,

KILLWORTH, GOTTMAN, HAGAN &
SCHAEFF, L.L.P.

By 
Robert L. Showalter, Reg. No. 33,579

One Dayton Centre
One South Main Street, Suite 500
Dayton, Ohio 45402-2023
Telephone: (937)223-2050
Facsimile: (937)223-0724